The Myth of Originality

Book Section

1

The Myth of Originality

Digital deceptions and analogue conceptions

John Monk

Nineteenth and twentieth century engineers successfully analysed electrical, hydraulic and thermal devices using mathematical techniques. In each of their specialist branches of engineering the mathematical symbols stood for different theoretical entities but were connected by similar mathematical relations. Bound together by a common mathematical tradition, the behaviour and performance of constructions in one engineering field could act as an analogue for the behaviour and performance of configurations of components in another. Oliver Heaviside, a nineteenth century engineer, for instance, hinted at a potential analogue when he explained,

> we may regard … a wire joining two points as being always filled with electricity, … that … must follow the same law of continuity as a real, incompressible fluid.
>
> (Heaviside 1882)

As electronic systems developed, the speed of electronic devices, their relatively small size and the ease of their reconfiguration through wiring changes meant that it was sometimes quicker and simpler to create an electronic analogue than doing the mathematics (Puchta 1996) or safer and cheaper than building a thermal, hydraulic, mechanical or electrical proto-

type. Specialised mechanical, electrical and later electronic machines were built for creating analogues and became known as analogue computers (Hartley 1962 Chap.1). As Key related

> [t]he analogue computer consists of electrical units which … may be easily connected together so that electrical voltages obey the same mathematical laws as the variables on the real machine
>
> (Key 1965 p.1).

Analogue computers were used chiefly to study systems that could be described by the differential calculus of Leibnitz, which deals primarily with smoothly changing mathematical functions.

The term "analogue" was applied to computers that carried out the operations of the differential calculus and eventually to other electronic devices that processed smoothly changing electrical analogues of light, sound, temperature and other phenomena. And the use of the word *analogue* as an adjective emerged when smoothly changing electrical currents and voltages became known as analogue signals.

Although an electronic analogue may behave in an analogous way to, for example, a hydraulic device, as humans people cannot sense what happens and need a way of depicting what is occurring. In our depiction we can imagine a changing voltage drawn across a surface just as the wiggly groove around Edison's wax cylinders can be regarded as a portrayal of sound intensity extending across time. Since people know something about the relationship between the sound and its depiction on the wax cylinder, we can treat the groove on the wax cylinder as an analogue of sound — a violent wiggle, for instance, means a loud noise. And people can build machines to render automatically the analogue as a sound. Recording machines were also built that captured sounds and recorded them as a spatial analogue on the wax surface, although it is possible to create the analogue of an imaginary noise by scribbling on the wax cylinder in any way we want.

An advantage of the process was that the analogue of the sound, embedded in the wax, had different properties from the sound it depicted. A sound, for example, is ephemeral and cannot be picked up and carried, but a wax cylinder can. Through the creation of an analogue, the physical phenomena of sound could be transferred to a new time and new place. Similarly Alexander Graham Bell's telephone created an electrical analogue of sound that could be swiftly carried over great distances using wires then automatically converted back to sound in another location.

Thus an analogue offers modes of transformation, preservation and synthesis that are impossible for the analogous events.

Digital

John von Neumann was a key figure in the development of electronic computers. He died of a bone cancer in 1957 and during the course of his terminal illness he drafted notes that declared 'computing machines fall into two broad classes: "analog" and "digital"' (von Neumann 1958 p.3). The distinction he made was that analogue machines dealt in physical quantities (von Neumann 1958 p.3) whereas the digital machine dealt in 'a system of "markers"' (von Neumann 1958 p.6).

In practice the analogue computers were not particularly accurate (Jackson 1960 p.6) and while they met the requirements of many engineers, whose calculations were commonly performed using slide rules, they were insufficiently precise for accountants, actuaries, navigators and artillery officers. The analogue computer was also useless for tasks, such as the processing of written text or code breaking, that could not be portrayed by traditional engineering mathematics.

The electronic digital computer ultimately proved to be a more versatile instrument than its analogue counterpart. For a

period the hybrid computer — a hybrid of the established analogue computer and the budding digital computer — enabled analogue parts to do computations that are clumsily performed by digital computers (Korn & Korn 1964). After further development, the digital computer got cheaper and faster and, through economics rather than convenience, usurped the analogue components of the hybrid.

> The speed advantage of the analogue part of the hybrid computer led to considerable savings in computer time, and thus cost. Yet even though such benefits were demonstrable, hybrid computers were superseded by all-digital ones
>
> (Small 2001 p.266).

Brains

The mathematics that proved helpful in designing the circuits of the digital computer was derived from George Boole's work on the Laws of Thought (Boole 1854). This connection encouraged a comparison between the digital computer and the processes taking place inside the brain. Von Neumann, for example, felt it proper to stress 'the digital character of the nervous system' (von Neumann 1958 p.44). An equally renowned contemporary of von Neumann, Norbert Wiener described a digital machine as an 'all-or-none machine' (Wiener 1950 p.64) and observed, 'the greater part of the work which has been done on the mechanical simulacra of the brain has been on machines which are more or less digital' (Wiener 1950 p.65). Thus the workings of the digital computer, theories about the behaviour of the brain, logic and reasoning were alloyed.

Norbert Wiener counselled caution and wrote that '[i]f we insist too strongly on the brain as a glorified digital machine, we shall be subject to some very just criticism from the physiologists' (Wiener 1950 p.64). A part of his concern arose from a neglect of the brain's embodied situation which affected

its behaviour. Wiener brought the brain back to earth by observing that the neurons' 'thresholds are variable with temperature, and we have no reason to believe that they may not be variable with the chemistry of the blood and with many other phenomena which are not themselves originally of the all-or-none nature' (Wiener 1950 pp.64–65). Thus even if the brain were performing its computations like an idealised digital computer, the particular computation it performs would depend on the bodily circumstances of the brain, on, for example, hormone and nutritional levels. The outcome of thought would then be a hybrid of the digital processing of the neurons under the influence of the continuously changing, analogue, bodily conditions.

Von Neumann, too, was aware of 'complexities' that 'might influence the functioning of the nervous system' (von Neumann 1958 p.58), but he played down the possible effects, writing that 'they may be irrelevant' (von Neumann 1958 p.60), the cause of 'recondite over-all electrical effects' (von Neumann 1958 p.58) and may 'play no useful functional role' (von Neumann 1958 p.58). He reiterated that the nervous system is 'primarily digital' (von Neumann 1958 p.59) and he accommodated the complications by suggesting that a neuron was equivalent to not one but between ten and one hundred 'basic active organs' (von Neumann 1958 pp.59–60). Thus his view was that a situated neuron did the same job as a good handful of digital logic elements, and the logical model of the brain remained intact.

Games

Aside from his work on the digital computer, Von Neumann developed a theory of games (von Neumann & Morgenstern 1944). Games were a serious business during the burgeoning Cold War and at the time it was accepted, even by a critic, that 'human processes which constitute the object of government may be assimilated into games in the sense in which von

Neumann has studied them mathematically' (Dubarle 1948). The same anxious commentator though pointed out that 'human realities do not admit a sharp and certain determination, as numerical data of computation do'. Von Neumann's game theory recognised this but von Neumann did not suggest that the link made between digital computers and thought were inappropriate. Indeed, he concluded that 'the message-system used in the nervous system' (von Neumann 1958 p.79) gave not uncertainty but 'a higher level of logical reliability' (von Neumann 1958 p.80). And later it was claimed a 'digital nervous system enables a company to do information work with far more efficiency, depth, and creativity' (Gates 1999 p.20). The "supreme co-ordinator", the "*machine à gouverner*", which would exceed the capacity of a human brain and 'beat every player of a human game', seemed plausible (Dubarle 1948) and the overarching conclusion appeared to be that wise organisations, including governments, should deploy digital systems.

The expectation was that, governments could use computers to 'reveal where the real problems lay' (Bagrit 1966 p.60) and to 'arm administrators with so much detailed and up to date information that their judgements would be arrived at more accurately and wisely, and with far greater knowledge of their likely effect' (Bagrit 1966 p.61). A view modestly endorsed some thirty years later by the suggestion that '[g]overnments more than any other organization, can benefit from the increased efficiencies and improved service that stem from digital processes' (Gates 1999 p.358).

An Analogue World

One common metaphysical assumption is that '[t]he physical world is basically analog' (Tsividis 2003), meaning that there are no abrupt transitions and no clear boundaries to show where one thing begins and another ends. In the analogue conception sunsets have no clear beginning or end, adulthood

merges with childhood. and morality accommodates forbearance, but simultaneously brings vagueness and potential confusion. Where there are no boundaries everyone can set their own and the overlaps and gaps are sources of dispute. This analogue realm stands in opposition to Socrates' principle of good reasoning which requires 'division … according to the natural formation, where the joint is, not breaking any part as a bad carver might' (Plato 1892).

Digital is the signal for a mode of description that implies surgically slicing up some domain and thereby setting bounds and offering the opportunity to treat what lies inside as an undifferentiated space. To create a digital picture someone makes judgements. He or she adopts a point of view, or a convention, and institutes firm boundaries cleansed of what is regarded as trivial detail or unnecessary complexity.

But being *digital* involves more than boundary setting. It is also about communicating a standpoint, and about getting other people to see the world carved up and purified in a similar fashion. The resulting digital world is comprised of nothing but boundaries enclosing featureless spaces decontextualised, quantised and drained of significance, and offering no secure grounds for realigning the boundaries. This cleanliness and lack of complicating detail gives digital an aesthetic and subsequently an ethical hold so that digital becomes a label, a term of approval denoting good or beneficial, and a frequent surrogate for the word 'modern' (Monk 2001). For example

> Though the technical merits favoured neither outright, proponents of the digital computer invoked a progressive rhetoric, portraying the electronic analogue computer as outdated and as an anachronism soon to be swept aside
> (Small 2001 p.3)

With the process of digitization out of the way and differences of opinion resolved or ignored, business can be isolated from the potential lawlessness of digitization. But once digitised and cleansed of the analogue, human conduct becomes a barren,

formalised routine. So when it is asserted that 'digital data entry … virtually eliminates errors' (Gates 1999 pp.208–209) the outcome may be taken to be a sign of a successful and pragmatic resolution or evidence of a worrying detachment from critical opinion. Ultimately to be of interest, significance has to be regained but it is inevitably coloured by the prejudices, oversights and errors of the restorer.

Rights

Digital technology provides analogues which are bounded by rational models of thought and a rigid perspective but which are convenient, portable and readily interpreted by machines. Developments in digital technology automated the interpretation of programs, which are specific forms of analogue, and have narrowed the gap between such blueprints and useful products by reducing the skill, effort, material, capital and energy expended in the final stage of production. Fabrication is transferred to individuals who invest in production machinery in the form of a personal computer with its workaday software. Computer users become producers and derive products from analogues, known as software, the digitised transcripts laced with promises that turn a computer into a valued object such as a game, an entertainment, a word processor, a record keeper or a calculator. Since an analogue in the form of a digital transcript can often be replicated and interpreted readily, digital merchandise becomes easily copied expressions — transcripts, analogues, software with valued interpretations.

At one time production was protected by the shear endeavour and capital required, but as soon as production meant mechanically copying a configuration of bits, there were few physical barriers to the manufacture of duplicates.

There is little scope for an economy in the face of unbounded re-production. The development of an economy requires shortages which, for digital property, must be created artifi-

cially by the addition of technological, psychological, moral or legal barriers. It means constructing a game and persuading people to play by the rules. To be a participant, you have to learn how to maintain shortages and co-operate in maintaining them.

Although digital copies and productions become ubiquitous, the licences for exploiting them are restrictive. For instance, domain names locate computing resources on the Internet and can be used by anyone to access those resources but the procedures for issuing domain names give individuals or organisations exclusive rights to use their registered name to locate the resources that they nominate. These rights have become tradable and their use is restricted by contractual instruments, for instance,

> Sony has instructed its labels to ensure that new and existing contracts include provision for various online rights, including artists' internet domain names.
>
> (Rawsthorn 1999)

Thus the significant commodities in the digital economy are rights, and the maintenance of this rights economy comes to rely on the enforcement of licenses which is a matter for the law, legal institutions and other agents of morality rather than physics or chemistry. There are, for example 'criminal procedures … in cases of wilful … copyright piracy on a commercial scale' WTO 1994 Art.61).

A fascination with moralising folklore provides a channel for discouraging digital piracy. Moral tales, sometimes packaged as news, often stress the unfortunate outcomes for the villains in the story. There has been a report, for instance of

> … a steam roller … used to crush thousands of pirated compact disks, video tapes and software items during an anti-piracy crackdown
>
> (Manchester 1999)

Moral appeals often invoke connections with existing categories of wrongdoing and harm. A lawbreaker who offered 'pirate video games for sale' announced in a public apology that

> … illegal copying robs video game developers. … hurts the video game publishers … Piracy … ultimately hurts all of us who love playing video games
>
> (Baka & Baer 1999).

And the President of the Interactive Digital Software Association reported that

> Internet piracy … steals retail sales that fund R&D for future games. In the end, the millions of gamers who purchase legitimate interactive software suffer the most
>
> (Lowenstein 1998).

In many tales, the vulnerability of the rights holders is stressed. For instance, musicians are adamant that they 'want to use new digital technologies … [b]ut … will only feel confident doing so if … [they] know that the laws are there to stop … [their] works falling victim to pirates. (Artists 1999). Some statements also suggest that respect for declared rights will ensure that some generalised good will filter through to a wider community. The Director General of WIPO, for instance, linked 'the progress of humankind' to the 'capacity to advance ever further in … technology and culture' and each of these advances, he claimed, 'represents an "intellectual property"' and that 'whoever originates or legally owns such property deserves the right to protection' (Idris 1999). Through legend, myth and through, for instance, copyright and trademark laws, the rights to use digital expressions in various ways become properties.

Digital Property

The vanguard of widespread digitization is found in the tradition of ownership. Ownership divides up custody of the world, its exploitation and maintenance. It carries with it

declared rights and responsibilities and has become a familiar way in which to signal authority and hence wield influence. Ownership relies on a binding between properties and their owners, and this in turn requires ways of individuating and identifying owners and property. This quantization is not only a feature of digital electronic technology but it is also a prerequisite for indisputable claims for possession of any corner of our world, and thus the precondition of property and for trade.

Ownership requires a distinguished fragment of the world to be owned, a distinguished owner and a binding between the owner and their property. In the analogue conception the binding between properties and owners can be established by physical means. But in the analogue conception there is no clear and obvious place to mark a boundary — everything seems connected.

The neatly divided, digital realm provides a promise of rightful trade. However, in the digital domain nothing is indelibly connected and the digital landscape composed only of boundaries with a significance secured by a regard for a moral tenet makes the unerring identification of digital property and of people problematic. Digital technology corrodes the traditional bonds between a location, a property and aids the growth of bureaucracy that, for example, substitutes digital chronicles for bodily identity. Thus characteristic textures and locations alone can no longer be treated as signatures for an entity and specific boundaries and bindings can only be rooted in signs, declarations and licenses that themselves are composed of characteristic sequences, patterns and arrangements. Ownership, therefore, comes to rely on a mutual respect for declarations about property rights.

Ownership means having some authority over the use of an ensemble of bits but properties can multiply as licenses are refined to refer to specific forms of production, places and

times. A single series of artefacts comes to have different rights attached to each production with potentially, different title holders:

> [i]f the copyrighted work is a popular song, for example, the reproduction and distribution rights are typically owned by a music publisher and licensed through the Harry Fox Agency to record companies, while the performance right is licensed through a performing rights society
>
> (Litman 1994).

Or rights can be allocated for exploiting a single expression in different ways

> Transport rights include permission to copy, transfer or loan. Render rights allow for playing and printing. Derivative work rights include extracting and editing information and embedding it in other publications. Other rights govern the making and restoring of backup copies
>
> (Stefik 1997).

There must also be a right to allocate rights.

Ownership, then, is the legally authorised possession of certain rights in association with some artefact. If rights themselves are not to become a worthless commodity then their allocation must be restricted. Similarly, reproductions of rights have to be either successfully prohibited or rendered meaningless. The allocation of rights, therefore, is awarded to authorities. In some political systems, emerging commodities are the property of an abstract beneficiary such as the state, the monarch or a political rank but commonly it is the custom to award rights, initially, to an author who has displayed originality. Where the originator has traded his or her title, the originators claim to originality shoulders the integrity of a chain of deals and the rights of the current title holder. Such a social arrangement that bestows power on those who can claim a formal connection with an original conception is liable to provoke disputes and entertain jealousies, as Gulliver in Swift's *Gulliver's Travels*

explains: 'it were the custom of our learned in Europe to steal inventions from each other, … thereby … it became a controversy which was the right owner' (Swift 1726). Thus authors, or originators are at the heart of originality wrangles in, for instance, 'the justificatory arguments made by those who wish to establish the copyrightablity of computer software' (Halbert 1994).

In the framework of modernity, justice and hence rights demand rationalisation and a moral anchor. Originality attributed to individuals provides such an anchor and is therefore endorsed as a virtue. However the Socratic position presumes people are midwives to what they know and any, apparently new, commodity always had an existence and no one person can be said to have been its originator. This is not an easy issue to settle and generates 'a modern tension between Diderot's conception of the author as the original creator and hence inviolable proprietor of his works and Condorcet's depiction of the ideal author as the passive midwife to the disclosure of objective knowledge' (Hesse 1990). These days, in practice, the law and legend grant both the author and the midwife rights; invention and discovery have both been privatised and individualised.

Resemblance

To say that something is a copy requires a judgement about the degree of resemblance between the copy and its prototype. A copy and its original have some of the same properties but as distinct and separate objects are dissimilar.

A copy is a production. When copies of documents were made by writing them out longhand, it was, perhaps, clear that they were a production because productions and re-productions required skilled performances on the part of the people fashioning them. Those skilled performances added idiosyncratic charm, and introduced variations that made one re-pro-

duction perceptibly different from others and different from the original. However, often the aim of producing a copy is to create a deception about which object is the original and which is the copy. For example, a copy of military hardware may be deployed to fool an enemy, or a counterfeit coin, banknote or painting may successfully deceive a victim.

The precision of contemporary reproduction machinery leads people to claim that for the 'Digital Copy' copies are indistinguishable from their prototypes — as a slogan in a shop window claimed 'Every one an original' (Prontaprint 1999) — so small perceptible inaccuracies can no longer act as a signature of forgeries and resemblance is not an adequate criterion for identifying a copy, since it does not pinpoint which, if any, of several objects is the original. In addition to a likeness, to call something a copy we have to picture a causal connection between the original and the copy. But Tolstoy provided a reminder that causes are indiscernible

> I see only a coincidence of occurrences …, and I see that however much and however carefully I study the hands of the watch, the valve and the wheels of the engine, and the oak-bud, I shall never find out what makes the bells ring, the locomotive move and the wind blow in spring.
>
> (Tolstoy 1978 p.976)

This implies that a copy is identified by applying a theory since

> Presumptions about causality escape our perceptions. They must always be imagined, implied to be true, believed
>
> (Beck 1992 p.28).

The causal connection could be inspired by physics when the copier is a machine or by psychology if the copyist is a person.

Today to make a copy of, for example, a document ordinarily implies using a machine. A copying machine does not operate autonomously; it is a kind of programmable machine, where the program, the original, resembles the product. Therefore,

one kind of causal connection is where one object causes the production of a facsimile. The second kind of causal connection is where one unique object, an analogue, is seen to be a cause of the production of more than one artefact and members of the production series are seen to be copies of one another. In a series of productions, of cars, dinner plates or posters, successive products may be judged to be replicas of one another and their similarities are attributed to a common design or having been produced on the same machine or on a machine of the same design. Thus we have copies without an original and it is assumed that there is a causal connection between, for instance, a series of artefacts and an analogue in the form of a unique process, plan or prototype.

Similar products may be generated by dissimilar production systems. Music may be, for example, derived from a CD, a tape or an MP3 computer file, but any such analogue in a causal chain linking the originator with a production might be said to be derived from the original. These derivative analogues may be in a different form but their conventional interpretations are in some way indistinct. These analogues that have similar interpretations are sometimes treated in the same way as copies.

There are, then, two criteria for declaring something to be a copy: one is about the causal relations that led to its production which can only be a belief and the other is that the conventional presentation of a copy resembles the conventional presentation of the original and this requires a judgement.

Discovery and originality are seen to break causal chains linking people so at some point it can be claimed that either a discovery was not induced or originality was not caused by anyone else. In an echo of John Stuart Mill (Mill 1869) the causal chain of the copyist is adroitly severed and, according to Monsieur Troplong, the 'spontaneous impulse of the individual mind is … a cause of its originality' (Proudhon 1972

p.309). The presumption is that there was a psychological event (or for a discovery an external but private event) that an individual experienced which was the genesis of the discovery or original thought.

An original is not a copy, and because the originality is not ultimately caused by anyone or anything but perhaps, it might be claimed, traceable to a spontaneous, concealed psychological event, it must be the scion of one person and its title is therefore unambiguous. This leads to three criteria for assessing originality:

a. Some person experienced a private event causally connected with the production of the original object
b. There are causal connections leading to only some but not all the ingredients of the private event
c. Conventional presentations of the original object do not resemble the conventional presentation of any other object in existence before the appearance of the original.

All three criteria are matters of belief and judgement and this implies that any claim to originality is provisional and potentially controversial.

Tolstoy

A judgement about originality forms part of an historical account of events surrounding an author.

In War and Peace, Tolstoy expanded on the character of historical accounts and the tendency to ascribe the responsibility for events to particular individuals who have freedom of action and who become the villains or heroes of our histories. In a technological context historians have demonstrated a similar

prejudice because '[i]t is easier to let a hero personify a whole series of events'. After all

> technological changes … involved complicated, prolonged, and ambiguous social, economic, and political interactions by many persons … too difficult for general historians, as well as the general public, to summarize except in mythical form.
>
> (Cooper 2003)

Nevertheless Tolstoy wanted us to 'leave aside kings, ministers and generals, and select for study the homogeneous, infinitesimal elements which influence the masses' (Tolstoy 1978 p.977).

At the heart of Tolstoy's argument is the contest between free will and compulsion. He rejects free will as the only determinant of the flow of history since then 'history would be a series of disconnected accidents' (Tolstoy 1978 p.1426). Besides 'every human action', he affirmed, 'is inevitably conditioned by what surrounds him and by his own body' (Tolstoy 1978 p.1436). He admitted that we seem to be free when looking at ourselves from within and thereby treating humankind 'as the object of our own inner consciousness' (Tolstoy 1978 p.1427) however, just as it is hard to accept that the earth moves through space while our consciousness tells us that it is stationary, so

> the obstacle in the way of recognizing the subjection of the individual to the laws of space and time and causality lies in the difficulty of renouncing one's personal impression of being independent of those laws
>
> (Tolstoy 1978 p.1443)

Tolstoy argues, there are many relationships between people and their surroundings that we do not understand and cannot rationalise. In our spontaneous actions, our consciousness is oblivious of many of the causes of our actions. It is this mys-

tery about the causes of our behaviour that leads us to introduce free will in our explanations of events.

> What is known to us we call the laws of necessity; what is unknown we call freewill
>
> (Tolstoy 1978 p.1440).

Reason and logic digitise our experience, link it with specific causes and provide the raw materials for explanations but they also shroud a residue of unnoticed causes. And it is the force of free will, 'an expression connoting what we do not know about the laws of human life' (Tolstoy 1978 p.1440), that becomes the object of enquiry for history.

Tolstoy equates freedom with content and necessity with form. Individually they are mutually exclusive and incomprehensible (Tolstoy 1978 p.1439). Conveniently, Tolstoy maintains, in the study of history we are not compelled to unravel the 'insoluble mystery presented by the union of freewill and necessity' (Tolstoy 1978 p.1426), since we can deal with the hybrid 'presentation of the life of man in which the union of those two antimonies has already taken place' (Tolstoy 1978 p.1426).

By extension, Tolstoy's thesis challenges the notion of originality. Do we exercise free will or are we necessarily, but unwittingly, bound by laws of physics so that our freedom to act and hence our originality is an illusion? If originality is an expression of free will then Tolstoy's critique translates 'originality' into a sign of our ignorance. We cannot then rationally attribute originality to an individual who is merely a conduit for hidden causes, and originality as a character trait becomes a component of our moral vocabulary that can only be sustained by rhetoric and myth and not reason.

Perceptions of Originality

The author of a work may claim a work is original but confirmation is expected to come from spectators who are qualified to pass judgement. That judgement will be influenced by evidence of the degree of freedom available to the originator, but if we are making a judgement then 'our conception of the degree of freedom varies with the point of view from which we examine the phenomenon' (Tolstoy 1978 p.1431).

Where we are most uncertain of the causes, we either make moral judgements about people's actions or, when actions seem amoral, we ascribe 'individuality, originality and independence'. But if 'one of the countless causes become known to us … we … are … less ready to acknowledge … freedom in the apparently original performance' (Tolstoy 1978 p.1434), and the tag of "originality" seems less appropriate.

An account that isolates someone from their environment seems to give them freedom but as soon as we introduce any object or person 'our impression of freewill and necessity is gradually diminished or increased according to the degree of connexion with the external world' (Tolstoy 1978 p.1435). If we know the specific circumstances of an act, then it will appear that the actor was 'more subject to the law of necessity' (Tolstoy 1978 p.1431) and hence has less scope for originality. The 'activities of people who lived centuries ago … cannot seem … as free as the life of a contemporary' since as time passes, the consequences of an innovation become entwined in ways of life and it becomes easier to be persuaded that an innovation was inevitable. (Tolstoy 1978 p.1433).

Tolstoy argues that 'the will of our historical hero … is itself continuously controlled' (Tolstoy 1978 p.1168) but often historical accounts mistakenly aggregate series of minor happenings; and they similarly garner 'a series of commands … into a single expression of will' (Tolstoy 1978 p.1421). The form of

the resulting digitised history depends on where boundaries have been set.

We also idealise the notion of a command. We disregard commands that do not 'produce any effect' (Tolstoy 1978 p.1419) and note only those that coincide 'with the course of events'. And if the person who issued such providential instructions was 'a participator in the event' we may dub them as a leader (Tolstoy 1978 p.1421).

Tolstoy explains that in an enterprise everyone talks about the group's objectives. In the roles that they adopt and maintain some will work directly towards the group's goal. Others will spend more time talking, and in any account of the project, we tend to aggregate the free will and attribute it the talkers and aggregate the compulsion and attribute it to those executing the task. Thus in our retrospective accounts of events we introduce a phantom influence exercised by the commander or an author of events and this illusory influence helps to sustain myths of individual, cultural or popular supremacy (Tolstoy 1978 p.1422).

Applying Tostoy's reasoning to originality suggests a whole raft of causes and effects brings a commodity into existence and no one person can be identified as an originator. This argument is submerged in a mythology that packages influences on the work of a proclaimed author. Through neat linguistic tricks, influences on what is called an original production are called inspirations or intuitions while influences on what are called copies are seen as causes and the myth of individual conception is preserved.

Critique

To convince others about the originality of an artefact a story, a history of how a product came into use has to be constructed. We often assume people, especially the heroes,

inventors and authors, have garnered the free will, so it is their actions that force events. Tolstoy wanted, instead, to reduce the 'element of free will to the infinitesimal' and then 'instead of seeking causes, history will adopt for its task the investigation of historical laws' (Tolstoy 1978 p.1441). He alluded to the influence of the differential calculus of Liebniz when he wrote,

> Abandoning the concept of causation, mathematics looks for laws, i.e. the properties common to all the infinitely small unknown elements.
>
> (Tolstoy 1978 p.1441)

He proposed that history should set aside

> the notion of cause and seek the laws common to all the equal and indissolubly interconnected infinitesimal elements of free will.
>
> (Tolstoy 1978 p.1442)

We instinctively divide the world up into entities. Perhaps coerced by our use of language, 'human reason postulates arbitrary, separated units', and this governs our methods for constructing accounts of the past and the future. We are inclined to divide happenings into separate events, although as Tolstoy remarks, 'there is and can be no *beginning* to any event, for one event flows without any break of continuity from another.' And we attribute 'the sum of many individual wills' to an individual such as a king or commander. But as Tolstoy concludes

> The critic has only to select some larger or smaller unit as the subject of observation — as criticism has every right to do … for any deduction drawn from history to disintegrate into small particles like dust
>
> (Tolstoy 1978 p.975)

In an attempt to increase the precision, Tolstoy writes,

> Historical science … is constantly isolating smaller and smaller units for examination. But, however small the units it takes, we feel that to postulate any disconnected

> unit, or to say that the volitions of men are expressed in the actions of any one historical character, is false
>
> (Tolstoy 1978 p.975)

Tolstoy attributed 'a large proportion of human error' to the way in which people arbitrarily divide 'continuous motion into discontinuous units' (Tolstoy 1978 p.974). He preferred the view where 'the march of humanity … is continuous' and springs from 'an infinite multitude of individual wills'. His proposal, in a reference to Laplace's calculus, involved 'assuming infinitesimally small units for observation — a differential of history — … and arriving at the art of integration' (Tolstoy 1978 p.975). Tolstoy illustrates how we introduce errors by referring to the legend of Achilles and the tortoise.

> By adopting smaller and smaller elements of motion we only approach a solution of the problem, but never reach it.
>
> (Tolstoy 1978 p.974)

When referring to what electronic engineers came to call the analogue domain he suggests that error will be removed.

> This new branch of mathematics, … by admitting the conception … of the infinitely small … corrects the inevitable error which the human intellect cannot but make if it considers separate units of motion instead of continuous motion.
>
> (Tolstoy 1978 p.974)

'Only by admitting infinitesimal quantities' can we obtain a solution to our problem, but Tolstoy also observed 'It is impossible for the human intellect to grasp the idea of absolute continuity of motion' (Tolstoy 1978 p.974) and so placed his ideal beyond our grasp since we cannot explore the infinitude of space, time and chains of causes.

But the digital is a deliberate approximation and the analogue is an unattainable ideal that requires

> an intelligence which could comprehend all the forces by which nature is animated and the respective situation of the beings who compose it
>
> (Laplace 1952).

The conclusion is that either we adopt a digital view, break the universe and its history up into discrete entities and provide questionable explanations or we adopt an analogue view and embark on the impractical task of coping with the continuum of everything.

This creates a difficulty for theories about originality, since it means there can be no proper account of the origin of anything. Some people therefore question 'the romantic myth of authorship' which may simply be 'a ploy' (Halbert 1994), but it is a ploy that underpins a vast edifice of contemporary trade. The myth is therefore nurtured in spite of some obvious scepticism:

> We are supposed to pretend that some particular … concepts sprang fully grown from the head of a specific programmer, totally without reference to prior art. Bullshit.
>
> (Cringely 1992 p.74–75)

The Myth

What, then, are the ingredients of myths of originality? Since originality provides criteria for regulating the creation of new kinds of commodity it must appear to be uncommon, otherwise it would become a commodity in oversupply. Therefore most people are expected to be disinterested or incapable of offering anything original. They will be reluctant to embrace 'originality in thought and action' and 'nearly all, at heart, think that they can do very well without it' (Mill 1869). The special value attributed to originality implies that it will ultimately bestow renown so that 'the great originators' will be

'lifted up among the constellations and … rule our fates' (Eliot 1981). Originality is thus linked with distinguished personalities, and Shakespeare's work, unsurprisingly, is therefore offered as an 'example of unrivalled originality' (Godwin 1831 p.196).

Originality is a presented as a rare talent that most people are unlikely to display, and many claims for originality will, therefore, have to be rejected as delusions, when, for instance 'You feel pleased at your own inventiveness and originality' you are likely to be persuaded that 'you are really like the wren when it took a lift on the eagle's shoulder' (Conan Doyle 1895 pp.132–3).

Most people are expected to be disinterested or incapable of offering anything original. They will be reluctant to embrace 'originality in thought and action' and 'nearly all, at heart, think that they can do very well without it' (Mill 1869). The special value attributed to originality implies that it will ultimately bestow renown so that 'the great originators' will be 'lifted up among the constellations and … rule our fates' (Eliot 1981). Originality is thus linked with distinguished personalities, and Shakespeare's work, unsurprisingly, is therefore offered as an 'example of unrivalled originality' (Godwin 1831 p.196).

Originality must be placed outside the realm of science since a formula for consistently generating originality would threaten its scarcity. Consequently it must be affirmed that 'technology … leaves the original and creative to us' (Kelly 1998) and therefore 'humans have the original thoughts and that isn't in the potential realms of computing' (Evans 1999).

Accidents are events triggered by unanticipated causes, which may subsequently be uncovered. Originality cannot therefore be presented as the result of an accident and '[t]here is nothing original in absent-mindedness. True originality lies elsewhere.' (Forster 1992 p.132). Besides if an original thought arose from accidents or absent-mindedness then it could hardly be promoted as the outcome of a worthy effort. But, provided

there is no suggestion that specific original conceptions have specific causes, a disposition towards originality can be stirred, for example, by inspiring personalities as when

> she cast her lights and shadows around the rooms that held her, until she … metamorphosed the stray telegraph boy into a Puck-like creature of delightful originality.
>
> (Fitzgerald 1997 p.200)

Similarly because there can be no causal connection between identifiable personal qualities and original works, people cannot be selected for their potential originality. Though a predisposition for originality is, unsurprisingly, sometimes linked with gender but, in this arena, there is a lack of agreement over the relationship. Some authors 'assign originality and authority to men' (Pisan 1621) while others presume that logical thought attributed to men annihilates originality (Kirkland 1918 p.12).

Originality is not something that formal training can develop and promote since this would imply a causal association between teachers and the originality on the part of their students.

While there is a bar on definable causes of original conceptions, it is acceptable to catalogue impediments. It is assumed, for instance, that certain kinds of education can suppress free will and an innate potential for originality:

> The great Government print-factory schools turn out still faster their bolts of human calico, … With another generation, the literal aboriginal mind, with all its value of originality, individuality, … will have disappeared.
>
> (Anonymous 1901)

A predisposition towards useful originality might also be bridled by a diet which wastefully diverts mental processes. For instance,

> Christmas puddings, brawn, and abundance of spirituous liquors, throwing the mental originality into the channel

> of nightmare, are great preservatives against a dangerous spontaneity of waking thought
>
> (Eliot 2001)

Devices, it is clear, are endorsed as expressions of originality; for example, when Edison's experimentation is noted for its 'originality, as expressed in a number of minor useful devices' (Dyer & Martin 1910 p.598). But the people that materialise an expression may not be the originators so for instance, scientists have been seen as the fount of creativity while '[p]ragmatism and technical skill were poor relations'. Some, therefore, are destined to be agents who convey the originality of others and this view has, for instance, established engineers as the people who followed through the 'theories and visions' of others who accrued a higher status. (Plant 1997 p.79).

Since originality is to be treated as a hallmark of value, originality is promoted as 'a valuable element in human affairs' (Mill 1869) 'a thing to be admired' (Mill 1869) and a quality to strive for — a virtue composed of 'individual vigour and manifold diversity' that 'every human being must ceaselessly direct his efforts' towards (Humboldt 1869). This moral imperative gains its strength from a belief in change and the 'need … to discover new truths, … to commence new practices, and set the example of more enlightened conduct, and better taste and sense' (Mill 1869). It is a quality that stands alongside other admirable virtues, exemplified by the character who was 'elevated … to an eminence where he stood almost alone' because of 'his quick perceptions and powers of concentration and analysis' and equally because '[i]n everything relating to mechanics, his opinions were marked with originality' (Orton 1859 p.578).

Originality is, according to Mill, essential for keeping valuable precepts alive without which 'the best beliefs and practices … degenerate into the mechanical', and this, Mill writes, requires 'a succession of persons whose ever-recurring originality pre-

vents the grounds of those beliefs and practices from becoming merely traditional' (Mill 1869). Originality is equated with thrill of novelty rather than the anguish of uncertainty to create a link between 'freshness and originality' (Anonymous 1892) and a connection between originality and a new dawn — something 'we all share with the morning and the springtime and other endless renewals' (Eliot 1981 p.256). But it does not imply good taste as Edgar Alan Poe revealed in his description of a chamber where

> Little attention had been paid to the decora of what is technically called keeping, or to the proprieties of nationality. The eye wandered from object to object, and rested upon none
>
> (Poe 1912 pp.149–150)

In spite of the clear intent to create a design 'to dazzle and astound' the proprietor felt it fitting to say "I see you are astonished at my …originality of conception…?"

An expression of originality can be simple. The Fowlers, for example, recognised a spectrum of originality ranging from 'Cheap originality' which they exemplified by the attempts by some writers to secure a ''distinction' of style' by 'writing a common expression backwards' and which is likened, as a literary device, to 'a machine for converting clean knives into dirty ones' (Fowler 1973 pp.226–227).

When 'a small swing looking-glass was disclosed, in which she proceeded to survey herself attentively' it was simply '[t]he change … from the dressing hour in a bedroom to a time of travelling out of doors' that 'clothed it in the freshness of an originality' (Hardy 1994). Originality, then, can arise in transposing an activity or an artefact to a new location. George Bernard Shaw, using his own work as an illustration, suggests that originality is the relocation of old motifs. He wrote,

> My stories are the old stories; my characters are the familiar …; my stage tricks and suspenses and thrills and jests

> are the ones in vogue when I was a boy … what the world calls originality is only an unaccustomed method of tickling it
>
> (Shaw 1915)

Originality, according to this view, is a product of the contrast between some project and current practices. As circumstances change, the originality, that was once notable, can fade; Shaw, for instance, reminds us that 'Karl Marx said of Stuart Mill that his eminence was due to the flatness of the surrounding country'; and Meyerbeer who 'seemed prodigiously original to the Parisians, when he first burst on them' later became 'the crow who followed Beethoven's plough' (Shaw 1915).

Plain reiteration is not enough; for instance 'the Cock-lane ghost' that rapped out its messages 'as the spirits of this very year last past … rapped out theirs' is considered to be 'supernaturally deficient in originality' (Dickens 1994). But the scale of a creation does not matter: 'in reality, all poetry and all art, that have a genuine claim to originality, are new, the smallest, as well as the greatest.' (Godwin 1831 p.196) Originality can be in some small aspect of people's work; for instance, a 'copyright requires only a minimal amount of originality' (Nichols 1999) and 'with Blake, his early poems are technically admirable, and their originality is in an occasional rhythm' (Eliot 1920).

Originality is equated with creativity but expectations are not high. The originality that guarantees uniqueness and turns an object into a valued commodity hardly needs special talents and may just be a reserved sequence of numbers and letters on a car's registration plates as we are reminded in an advertisement:

> … Don't forget, originality, individuality, and the personal touch count too. … Secure that special combination of letters and numbers now.
>
> (DVLA 1998)

Conclusion

Analogues are convenient material intermediaries that lend their name to a descriptive term evident, for example, in the field of computing. As Small reports

> The unifying characteristic of analogue computing devices is that they are continuous mathematical machines. … This … differentiates them from digital computing devices which … operate in discrete steps on discontinuous data.
>
> (Small 2001 p.30)

"Analogue" has therefore come to indicate a world in which phenomena are smoothly changing and indivisible, a world where every infinitesimal thing is connected and where there can be no distinct objects or personages and ultimately no causes or effects.

But such a holistic view prevents analysis or explanation. It makes the conduct of human affairs a collective effort, predestined but unfathomable. It is the fatalists outlook which if pursued implies radically that there are no such entities as individual human beings and creates a world in which, for example, owners and their property cannot be individuated.

In practice, many people adopt a hybrid view. They select isolated individuals, entities and instants and act as though the Universe was digital, but recognise that it may be analogue. Laplace, for instance, related phenomena without attributing a cause using universal laws so that, as he put it, 'the same formula' describes the relationships between 'the movements of the greatest bodies in the universe and those of the lightest atom' (Laplace 1952). But to apply his formulae Laplace had divided the world into discrete "atoms" and "bodies" to form a hybrid world of distinct entities which, incongruously, had properties and relationships that suffered no discontinuity.

Dividing the world up into discontinuous chunks provides a digital outlook which infuses a taste of logic and precision. The digital view promotes rationality, permits causal explanations and, through its connection with recent technological developments, intimates that entities can be easily replicated.

If the world is ultimately analogue then a digital or a logical perspective can only provide a skeleton of an account, and what constitutes the universe of objects, events, rights and individuals is vulnerable to criticism. Within a hybrid description, people reason about their favoured objects, but must occasionally and reluctantly accept that their inventory may not be the best and that their lexicon is provisional. For those seeking absolute security there is hope in an hypothesis that presents a world condensed into a finite, perceptible, unfailing expression. No view is open to verification or refutation, but on the basis of these ideologies we build our processes and procedures and our utopias.

Aside from those who believe they have found a way of faithfully depicting the cosmos or the pragmatists who choose not to devote time to formulate alternatives, curiosity and anxiety will drive people to embark on a quest to find new modes of expression that might be better suited to their purposes. Scientists for example seek new explanations and poets seek new uses for words. In their search, people may not wish to cover old ground, and the hallmarking of novelties provides monuments that can guide their exploration. Publicly attributing inventiveness to an individual's work situates an analysis or explanation in space and in time and brings it to the attention of others. A prompt declaration of originality can inform the search for more pertinent modes of expression.

It would not matter too much who generated a claim about an original expression except that the value in originality has been transmuted into an economic good and has borne a system of

commerce in which the creator of an original expression is entitled to trade or retain rights surrounding the artefact.

The myths about originality sustain a set of practices within our economic systems. Originality is treated as a token of worth but it is rooted in our uncertainty about causes. Our uncertainties may ultimately be fostered by a non-deterministic world, a failure of human modes of expression to explain the world, or perhaps both. Whether or not we should attribute the uncertainties to the metabolism of individual human beings, the processes of thought or the physical world in general are open questions. But the myths of originality are nourished by this uncertainty which provides an inexplicable void in our perceptions. It is a void that is apparent in the gulf between what our consciousness tells us about the world and what our rational reflections tell us — the difference between the analogue and the digital. It is a product of free-will which according to some accounts may be an illusion.

Economics superimposes its goals, which focus on gaining precedence rather than insight or wisdom, on originality. The uncertainties surrounding judgements of originality coupled with this economic role provide a source of conflict. On the other hand the economic activity provides comprehensive records of novelties and an urge to try things that have not been tried before. Economics both fuels and stabilises the chaos surrounding our attempts to renew our ways of describing the world. Originality kindles dreams, but is ultimately only acceptable to the pragmatist who adopt mythological hybrid descriptions of their world.

Bibliography

(Abrams 1998) M. H. Abrams, cited by (Delville 1998)

(Addison 1712) Joseph Addison, *Taste and the Pleasures of the Imagination*, 1712, No.414 in (Bond 1970 p.184)

(Adorno 1973) T. W. Adorno, *Philosophy of Modern Music,* Sheed & Ward: London, 1972

(Agassi 1981) J. Agassi, *Science and Society: Studies in the Sociology of Science*, Reidel: Dordrecht, 1981

(Althuser 1965) L. Althusser, *For Marx*, translated by B. Brewster, Allen Lane/The Penguin Press: London, 1965, p.69

(Andreeva 1995) E Andreeva, *Sots Art. Soviet Artists of the 1970s and 1980s*, Craftsman House: Roseville East, 1995, p.92

(Anonymous 1892) Literary Chat, *Munsey's Magazine*, Vol.VIII, No.1, Oct. 1892, pp.111–115

(Anonymous 1901) Anonymous, 'The Indian of Commerce', *The Nation*, E.L. Godkin: New York, Vol.72, 18 Apr. 1901, pp.319–320.

(Appignanesi 1989) *Novostroika. New Structures. Culture in the Soviet Union Today*, edited by L. Appignanesi, ICA: London, 1989

(Archer 2000) Phil Archer, ARiADA Texts, No.1, Dec. 2000, http://ariada.uea.ac.uk:16080/ariadatexts/ariada1/

(Archer 2002) Phil Archer, ARiADA Research seminar, University of East Anglia, 10 Feb. 2002

(Arden 1980) *What can be automated?*, edited by B. W. Arden, The Computer Science & Engineering Research Study, MIT Press: Cambridge Mass., 1983

(Ars Electronica 1997) 'FleshFactor: Informationsmaschine Mensch', *Programme for Ars Electronica Festival*, Linz, Ars Electronica Center, 8–13 Sept. 1997

(Art Newspaper 1997) 'A Guide to the Biennale. Venice: Country by Country: the Exhibitors', *The Art Newspaper*, No.71, June 1997, Special Supplement, p.28

(Artinfo 2003) Alexander Brener, biographical information, accessible through http://www.artinfo.ru/, accessed July 2003

(Artists 1999) 'Artists Unite for Strong Copyright', Advertisement, *Financial Times,* 19 Jan. 1999, p.9

(Aulich & Sylvestrova 1999) J. Aulich & M. Sylvestrova, *Political Posters in Central and Eastern Europe 1945–95*, Manchester University Press: Manchester/ New York, 1999, pl.9.56, p.194

(Bagrit 1966) Leon Bagrit, *The Age of Automation*, Penguin: Harmondsworth, 1966, based on the Reith Lectures of 1964

(Baka & Baer 1999) Jeremy Baka & Trevor Baer, IDSA Press release, Interactive Digital Software Association Shuts Down On-Line Game Pirate, IDSA Press Release, Douglas Consulting Group, Washington DC. Feb. 22, 1999

(Bakhtin 1981) Mikhail Bakhtin, 'Epic And Novel: Toward a Methodology for the Study of the Novel' in *The Dialogical Imagination: Four Essays by M. M. Bakhtin*, edited by Michael Holquist, translated by Caryl Emerson and Michael Holquist, University of Texas Press: Austin, 1981, p.20

(Bakunin 1842) M. Bakunin, 'The Reaction in Germany', 1842, translated by M. B. Zeldin in (Edie et al. 1969)

(Barba 1991) Eugenio Barba, 'The Performer's Montage and the Director's Montage', from *A Dictionary of Theatre Anthropology: The Secret Art of the Performer*, Routledge: London, 1991, p.158

(Baridon 1985) Michel Baridon, 'Ruins as a Mental Construct' in *Journal of Garden History*, Vol.5, 1985, pp.84–96

(Baridon 1995) Michel Baridon, 'The Gothic Revival and the Theory of Knowledge in the First Phase of the Enlightenment' in *Exhibited by Candlelight. Sources and Development in the Gothic Tradition*, edited by V. Tinkler Villani & Peter Davidson, Rodopi: Amsterdam, 1995, pp.43–56

(Barr 1936) Alfred H. Barr, 'Malevich and Suprematism' in *Cubism and Abstract Art*, Museum of Modern Art: New York, pp.122–128.

(Bateson 1972) G. Bateson, *Steps to an Ecology of Mind*, Balantine Books: New York, 1972

(Bateson 1980) G. Bateson, *Mind and Nature: a necessary unity*, Bantam Books: New York, 1980

(Batey 1983) Mavis Batey, 'The way to view Rousham by Kent's Gardener' in *Journal of Garden History*, Vol.11, No.2, 1983, pp.125–132

(Baudrillard 1970) Jean Baudrillard, 'Consumer Society', 1970, reprinted in (Poster 1988 p.29)

(Baudrillard 1976) J. Baudrillard, 'The Hyper-realism of simulation', 1976 reprinted in (Poster 1988 pp.143–7)

(Bear 2003) Richard Bear, Introduction to Lady Mary Wroth, *Pamphilia to Amphilanthus*, 1621, Renascence Editions text, http://darkwing.uoregon.edu/%7Erbear/mary.html, accessed July 2003

(Beck 1992) Ulrich Beck, *Risk Society*, translated by Mark Ritter, Sage: London, 1992

(Bending 1994) Stephen Bending, 'Horace Walpole and Eighteenth Century Garden History', *Journal of the Courtauld and Warburg Institutes*, Vol.57, 1994, pp.209–226

(Benjamin 1985) Walter Benjamin, 'The Work of Art in the Age of Mechanical Reproduction' in *Illuminations*, New York: Schocken 1985, pp 217–252

(Benjamin 1992) Walter Benjamin, 'The Task of the Translator' in *Illuminations*, translated by Harry Zohn, London, Fontana, 1992, pp.70–82

(Bennett 2002) ARiADA research seminar, University of East Anglia, 15 Oct. 2002

(Bennett 2003) Justin Bennett, 'Documentation of Projects', http://www.bmbcon.demon.nl/justin/docs/index.htm, accessed June 2003

(Berenguer 1997) Xavier Berenguer, 'Writing interactive programmes' at http://www.iua.upf.es/formats/formats1/a01at.htm, accessed July 2003

(Bermingham 1986) Ann Bermingham *Landscape and Ideology — The English Rustic Tradition 1740–1860*, University of California Press: Berkeley, 1986, pp.83–85

(Bermingham 1994) Ann Bermingham, 'The Picturesque and ready-to-wear femininity' in (Copley & Garside 1994 pp.81–119)

(Bernstein 1971) Bernstein, B. (1971), *Class, Codes and Control*, Vol.I., Theoretical Studies Towards a Sociology of Language, Routledge & Kegan: London, 1971

(Blacking 1973) J. Blacking, *How Musical is Man*?, University of Washington Press: Seattle, 1973

(Bond 1970) *Critical Essays from the Spectator by Joseph Addison*, edited by Donald F. Bond, Clarendon Press: Oxford, 1970

(Boole 1854) George Boole, *An Investigation into the Laws of Thought*, Constable: London, 1958, original published by Macmillan, 1854

(Bordieu 1979) P. Bourdieu, *Distinction. A Social Critique of the Judgement of Taste,* Harvard University Press: Cambridge Mass., 1979, pp.6, 30, 41, 273, 495

(Boubnova 1998) I. Boubnova, 'Post-What? Neo-How? For Whom, Where and When?', *Moscow Art Magazine,* No.22, 1998

(Bowers & Hellström 2000) John Bowers & Sten-Olof Hellström, 'Simple Interfaces to Complex Sound in Improvised Music' *CID–95* at Stockholm, Centre for User-Oriented Interface Design, http://cid.nada.kth.se/en/publicat/all.html

(Bowers 2003) John Bowers, 'Improvising Machines: Ethnographically and Aesthetically Informed Design for Improvised Electroacoustic Music' in *ARiADA Texts,* No.4, Apr. 2003, http://www.ariada.uea.ac.uk/

(Brener 1994) Alexander Brener, *Rendezvous, (with wife)/ Date,* 1994, action/performance, Pushkin Square Moscow, accessible through http://www.artinfo.ru/, accessed June 2003

(Brener 1997a) Alexander Brener, Dollar sign on Kasimir Malevich, *Suprematismus. Large White Cross on Grey*, Jan. 1997, green spray paint, Flash Art, Vol.xxx, No.194, May–June, p.88.

(Brener 1997) A. Brener, 'The Dream of Democratic Culture', *Its a Better World,* exhibition at Secession, Vienna, Austria, June 6–13, 1997, http://dll.botik.ru/ARTS/contemporary/362/RACT/S2.HTM, accessed July 2003

(Brener 1998) A. Brener, 'A Third World Artist', *Moscow Art Magazine,* East is Looking at the East. East is Looking at the West, No.22, Nov. 1998. Special English language internet edition, http://services.worldnet/~coronado/martmag.htm, not accessible July 2003

(Britannica 2003a) "Hybrid", *Encyclopædia Britannica,* Encyclopædia Britannica Premium Service. 29 Jun., 2003, http://www.britannica.com

(Britannica 2003b) "Thought", *Encyclopædia Britannica*, Encyclopædia Britannica Premium Service. 29 Jun., 2003, http://www.britannica.com

(Britannica 2003c) "Species" *Encyclopædia Britannica*, Encyclopædia Britannica Premium Service. 29 Jun., 2003, http://www.britannica.com/

(Burke 1980) William L. Burke, 'Spacetime, Geometry, Cosmology' University Science Books: Mill Valley, 1980

(Carroll 1962) L. Carroll, *Alice's Adventures in Wonderland* and *Through the Looking Glass*. Combined volume, Puffin Books: London, 1962

(Chambers 1772) William Chambers, *A dissertation on Oriental gardening,* Gregg: Farnborough, 1972, originally published by W. Griffin; London, 1772

(Chambers 1757) William Chambers, 'On the art of laying out gardens among the Chinese' in *Designs of Chinese Buildings, Furniture, Dresses, Machines, and Utensils,* published for The Author: London, 1757

(Charlesworth 1993) *The English Garden — Literary sources and documents*, edited by Michael Charlesworth, Vol.II, Helm Information: Mountfield, 1993

(Chase1943) Isabel Wakelin Urban Chase, *Horace Walpole: Gardenist*, Princeton University Press: Princeton, 1943, p 71

(Chion 1983) Michel Chion, *Guide des Objets sonores*, Buchet/Chastel/INA–GRM: Paris, 1983

(Chion 1991) Michel Chion, *L'art des sons fixés, ou la musique concrètement,* Editions Fontaine, Métamkine/Nota Bene/Sono-Concept, 1991

(Clark 1942) H. F. Clark 'Eighteenth Century Elysiums: The Rôle of 'association' in the Landscape Movement' in *Journal of the Warburgh and Courtauld Institutes*, Vol.6, 1942, pp.165–199

(Cole 1999) George Cole, 'Engineers welcome the age of knowledge', *Financial Times* June 2 1999, p.15

(Collins 2001) Nic Collins, 'Sled Dog for Hawaian guitar', feedback and modifed CD player, http://www.rachelhaferkamp.de/htm/performances/perfilms2001/collins_film1.htm, not accessible July 2003

(Collins n.d.) Nic Collins, 'Broken Light', on the CD *It Was A Dark and Stormy Night*, Trace Elements, EL101

(Conan 1999) *Perspectives on Garden History,* edited by Michel Conan, Dumbarton Oaks, 1999

(Conan Doyle 1895) *The Stark Munro Letters*, edited and arranged by Arthur Conan Doyle, Longmans, Green: London, 1895, p.132–133

(Consoli 1999) Angelo Consoli quoted in (Tucker 1999)

(Cox 1999) Brad Cox, 'Objects as property on the web', *IEEE Internet Computing*, Jan.–Feb. 1999, p.96

(Curnow 1981) Jim Curnow, *Variants on an early American Hymn Tune*, Jenson Publications, Inc, USA, 1981

(Cook & Everist 1999) *Rethinking Music*, edited by N. Cook, & M. Everist, Oxford University Press: Oxford, 1999

(Cook 2000) N. Cook, *Music. A Very Short Introduction*, Oxford University Press: Oxford, 2000

(Cooper 2003) Carolyn C. Cooper, 'Myth, Rumour, and History', *Technology and Culture*, Jan. 2003, Vol.4, pp.82–96

(Copley 1994) Stephen Copley, 'William Gilpin and the lead-mine' in (Copley & Garside 1994 pp.42–61)

(Copley & Garside 1994) *The Politics of the Picturesque*, edited by Stephen Copley and Peter Garside, Cambridge University Press: Cambridge, 1994

(Cringely 1992) Robert X. Cringely, *Accidental Empires*, Penguin: London, 1992

(Cufer 1998) E. Cufer, 'Mind your own Business', *Moscow Art Magazine*, no.22, 1998, p.2 of 3

(Dalrymple 1774) *An Essay on the Different Natural Situations of Gardens*, attributed to John Dalrymple, printed for J. Dodsley, 1774

(Dancy 1996) J. Dancy, *An Introduction to Contemporary Epistemology*, Oxford: Basil Blackwell, 1996

(Deleuze 1996) Concert *Homage to Gilles Deleuze* 19–20 Jan. 1996, Cité de la Musique

(Delville 1998) Michel Delville, 'The Prose Poem and the Ideology of Genre' in *The American Prose Poem: Poetic Form and the Boundaries of Genre*, University Press of Florida: Gainesville, 1998. Online version available at http://www.webdelsol.com/Del_Sol_Review/epicks3/delville.htm, accessed July 2003

(Derrida 1987) J. Derrida, *The Truth in Painting*, translated by G Bennington & I McLeod, University of Chicago Press: Chicago, 1987, pp.19–20, 73

(Derrida 1995) Jacques Derrida, 'Is There A Philosophical Language?' in (Weber 1995 p.219)

(Dickens 1994) Charles Dickens, *A Tale of Two Cities*, Project Gutenberg Etext #98, Jan., 1994, First Book, Chapter I

(Dickens 2003) Charles Dickens, *Hard Times*, Penguin Classics: Harmondsworth, 2003

(Diderot 1972) Denis Diderot, *Letters to Sophie Volland*, translated by Peter France, Oxford University Press: London, 1972

(Diderot 1986) Denis Diderot, *Rameau's Nephew/ D'Alembert's Dream*, translated by Leonard Tancock, Penguin: Harmondsworth, 1986

(Diderot 1991) Denis Diderot, *This Is Not A Story and Other Stories*, translated by P.N.Furbank, Oxford University Press: Oxford, 1991

(Diderot 1994a) Denis Diderot, *Oeuvres*, Tome 1 Philosophie, Éditions Robert Laffont: Paris, 1994

(Diderot 1994b) Denis Diderot, *Selected Writings on Art and Literature*, translated by Geoffrey Bremner, Penguin Books: London, 1994

(Dlugach 1988)	Tamara Dlugach, *Denis Diderot*, translated from the Russian by Catherine Judelson, Progress Publishers: Moscow, 1988
(Douglas 1987)	M. Douglas, (1987), *How Institutions Think*, Syracuse University Press: New York, 1987
(Douglas 1996)	M. Douglas, *Thought Styles*, Sage: London, 1996
(Druckrey 1999)	*Ars Electronica: Facing the Future*, edited by B. T. Druckrey, MIT Press: Cambridge Mass., 1999
(Dubarle 1948)	Père Dubarle, LeMonde Dec. 28, 1948, translation in (Wiener 1950), p179
(DVLA 1998)	DVLA Select Registrations advertisement, *Financial Times*, 18 Nov. 1998, p.15
(Dyagot 1998)	Ekaterina Dyogot, 'The Way To Obtain Rights for Post-Colonial Discourse', *Moscow Art Magazine*, No.22, 1988
(Dyer & Martin 1910)	Frank Lewis Dyer & Thomas Commerford Martin, *Edison, His Life and Inventions*, Vol.2 Harper and Brothers: New York, 1910
(EarthEar 2003)	EarthEar Soundscape Info Center — http://www.earthear.com/sscape/, accessed June 2003
(Eco 1992)	Umberto Eco, *Interpretation and Overinterpretation*, Cambridge University Press: Cambridge, 1992, pp.140–141
(Edie et al. 1969)	*Russian Philosophy*, Vol.1, *The Beginnings of Russian Philosophy. The Slavophiles. The Westernisers*, edited by J. M. Edie, J. P. Scanlan, & M. B. Zeldin, Quadrangle books: Chicago, 1969
(Edwards 2002)	Stefan Edwards, *Radio Pieces* first broadcast by Resonance FM: London, June 2002
(Edwards 2003)	Stefan Edwards in a seminar at the University of East Anglia, 10th March 2003

(Eisenberg 2003) Anne Eisenberg, 'Analog Over Digital? For a Better Ear Implant, Yes', *New York Times*, 29 May, 2003

(Eliot 1981) George Eliot, *Middlemarch: a study of provincial life*, English Library Edition. Penguin: Harmondsworth, 1981, p.175

(Eliot 2001) George Eliot, *Silas Marner*, A Penn State Electronic Classic, 2001, p.71

(Eliot 1920) T. S. Eliot, The Sacred Wood: Essays on Poetry and Criticism, Methuen: London, Blake, 1 I, 1920

(Emmerson 1986) *The Language of Electroacoustic Music*, edited by S. Emmerson, London: Macmillan, 1986

(Emmerson 2000) *Music, Electronic Media and Culture*, edited by S. Emmerson, Ashgate Publishing Limited: Aldershot, 2000

(Epstein 1999) M. N. Epstein, 'Post-Atheism. From Apophatic Theology to "Minimal Religion" ' in (Epstein at al. 1999) pp.347–52

(Epstein at al. 1999)) *Russian Postmodernism. New Perspectives on Soviet Culture*, edited by M. N. Epstein, A. Genes & S. M. Vladiv Glover, Berghan Books: Oxford, 1999

(Essl 2003) Karlheinz Essl, *REplay PLAYer* generative sound file shredder software available at http://www.essl.at/works/replay.html, accessed June 2003

(Evans 1999) Garreth Evans, Chief Executive of Knowledge Technologies International quoted in (Cole 1999)

(Fanelli 1997) F. Fanelli, 'Germano Celant brings Venice back into this summer's three ring circus of contemporary art', *The Art Newspaper*, No.71, special supplement, June 1997, p.26

(Fann 1967) *Ludwig Wittgenstein: The Man and His Philosophy*, edited by K. T. Fann, Harvester Press: Sussex, p.51

(Feyerabend 1975) P. Feyerabend, *Against Method*, Verso: London, 1975

(Fitzgerald 1997) F. Scott Fitzgerald, *This Side of Paradise*, Gutenberg Etext #805, Feb. 1997, Book 1, Chapter 4

(Forman 1971) P. Forman (1971), 'Weimar Culture, Causality, and Quantum Theory 1918–1927: Adaptation by German Physicists and Mathematicians to a Hostile Intellectual Environment' in (McCormmach 1971)

(Forster 1992) E. M. Forester, 'The Longest Journey' in *Great Novels of E. M. Forster*, Caroll & Graff: New York, 1992, p.132

(Foster 1985) *Postmodern Culture*, edited by H. Foster, Pluto Press: London, 1985

(Foucault 1970) Michel Foucault, *The Order of Things: An Archaeology of the Human Sciences*, Tavistock: London, 1970

(Fowler 1973) H. W. Fowler & F. G. Fowler, *The King's English*, Oxford University Press: Oxford, 1973

(Fubini 1991) E. Fubini, *The History of Music Aesthetics*, Macmillan Press: London, 1991

(Fujikawa 1998) Naohiro Fujikawa, 'Piano Music by Error System', on the 1998 CD *Ticklish Matters* (sub rosa sr 141/efa 10734–2)

(Furnbank 1992) P. N. Furbank, *Diderot: A Critical Biography*, Secker & Warburg: London, 1992

(Garzotto et al. 1995) Franca Garzotto, Luca Mainetti, and Paolo Paolini, 'Hypermedia Design, Analysis and Evaluation Issues' in *Communications of the Association for Computing Machinery*, Vol.38, No.8

(Gasking & Jackson 1967)
D. A. T. Gasking, & A. C. Jackson, (1967) 'Wittgenstein as a Teacher' in (Fann 1967)

(Gates 1999) Bill Gates, *Business at the speed of thought*, Penguin: London, 1999

(Georgescu-Roegen 1971)
N. Georgescu-Roegen, *The Entropy Law and the Economic Process*, Harvard University Press: Cambridge Mass., 1971

(Gilpin 1786) William Gilpin, *Observations chiefly to Picturesque Beauty*, London 1786, description of Hagley, pp.57–61

(Glover 1999) S. M. Vladiv Glover, 'Heterogeneity and the Russian Post-Avant Garde: The Excremental Poetics of Vladimir Sorokin' in (Epstein at al. 1999) pp.278, 280 and (Groys 1988 pp.107–108).

(Godwin 1831) William Godwin, *Thoughts on Man: His Nature, Productions, and Discoveries*, Effingham Wilson, Royal Exchange: London 1831

(Goehr 1992) L. Goehr, *The Imaginary Museum of Musical Works. An Essay in the Philosophy of Music*, Oxford: Clarendon Press, 1992

(Goffman 1975) Erving Goffman, *Frame Analysis*, Penguin: Harmondsworth, 1975, pp.560–561

(Goldhill 2002) Simon Goldhill, *The Invention of Prose*, Oxford University Press: Oxford, 2002

(Gombrich 1979) E. H. Gombrich, *The Story of Art*, Phaidon: Oxford, 1979, pp.198–201

(Göranzon 1993) *The Practical Intellect: Computers and Skills*, Springer-Verlag: London, 1993, edited by Bo Göranzon

(Gramsci 1932) A. Gramsci, *Gli intellecttuali e l'organizzazione della cultura, Quaderni XXIX*, english translation, *Selections from the Prison Notebooks of Antonio Gramsci*. edited and translated by Q. Hoare and G. Nowell-Smith, Lawrence & Wishart: London, 1971

(Gray 1962) C. Gray, *The Russian Experiment in Art*, Thames & Hudson: London, 1962

(Green 1936) *Diderot's Writings on the Theatre*, edited by F. C. Green, Cambridge University Press: Cambridge, 1936

(Greenberg 1939) C. Greenberg, 'Avant garde and kitsch', 1939 in (Greenberg 1989 p.8)

(Greenberg 1989) C. Greenberg, *Art and Culture*, Beacon: Boston, Mass., 1989

(Grillner 2000) Katja Grillner, *Ramble, linger, and gaze — dialogues from the landscape garden*, KTH: Stockholm, 2000

(Groys 1988) B. Groys, *The Total Art of Stalinism*, translated by C. Rougle, Princeton University Press: New Jersey, 1988, pp.7–8, 15–19, 31–2, 71–2, 81–5

(Hagman 1997) J. Hagman, 'Schilderij Malevich beklad met spuitbus', *Bulletin Stedelijk Museum*, Amsterdam, No.1, 1997, pp.22–23

(Halbert 1994) Debora Halbert, 'Computer Technology And Legal Discourse — The Potential for Modern Communication Technology to Challenge Legal Discourses of Authorship and Property', *E LAW*, Murdoch University Electronic Journal of Law, Vol.1, No.2, May 1994

(Hardy 1994) Thomas Hardy, *Far From the Madding Crowd*, Chapter 1, Gutenberg Etext #107, Feb. 1994

(Harris 1991) *Osip Mandelstam: Critical Prose and Letters*, edited by Jane Gary Harris, translated by Harris and Constance Link, Collins Harvill: London, 1991

(Hartley 1962) M. G. Hartley, *An Introduction to Electronic Analogue Computers*, Methuen: London, 1962

(Harwood 1993) Edward S. Harwood "Personal Identity and the eighteenth century english landscape garden" in *Journal of Garden History*, Vol.13, No.1, 1993, pp 36–48

(Harwood1996) Edward S. Harwood "Humphry Repton and the Idea of Association" in *Journal of Garden History*, Vol.16 no 3, 1996, pp.192–214

(Heaviside 1882) Oliver Heaviside, The Earth as a return Conductor, *The Electrician*, 11 Nov. 1882, p.605

(Hebdige 1979) D. Hebdige, *Subculture. The Meaning of Style*, Routledge: London, 1979, pp.11–19, 77–80, 90–91, 102, 118–121, 126–7, 132–3

(Hebdige 1983) Dick Hebdige, *Subculture: The Meaning of Style*, Methuen: London, 1983, p.91

(Heckert 2003) http://www.mattheckert.com/MSO/Sound_Machines.html, accessed June 2003

(Heely 1775) Joseph Heely, *A description of Hagley, Envil and the Leasowes*, printed by M. Swinney: Birmingham 1775

(Heely 1777) Joseph Heely, *Letters on the beauties of Hagley, Envil, and the Leasowes*, printed for R. Baldwin: London, 1777, Photographic reprint Garland: New York, 1982

(Hesse 1990) Carl Hesse, 'Enlightenment Epistemology and the Laws of Authorship in Revolutionary France, 1777–1793', *Representations*, No.30: Special issue on Law and the Order of Culture Spring, 1990, pp.109–137

(Hoogvelt 1997) A. Hoogvelt, *Globalisation and the Post-Colonial World*, Macmillan: London, 1997, pp.158–9

(Hughes 1998) Rolf Gullström-Hughes, 'Second Nature: Philosophy & Performance, Metaphors & Models', The Book of Models: Ceremonies, Metaphor, Performance, edited by R. Gullström-Hughes & J. Monk, Systems' Architecture Group, Open University: MIlton Keynes, 1998

(Humboldt 1869) Wilhelm Von Humboldt, eminent both as a savant and as a politician quoted in (Mill 1869)

(Hunt 1986) John Dixon Hunt, *Garden and Grove — The Italian Renaissance Garden in the English Imagination 1600–1750*, Princeton University Press: Princeton 1986

(Hunt & Willis 1975) *The Genius of a Place — The English Landscape garden 1620–1820*, edited by John Dixon Hunt and Peter Willis, Elek Books: London, 1975

(Hutcheon 1988) Linda Hutcheon, *A Poetics of Postmodernism: History, Theory, Fiction*, Routledge: New York/London, 1988

(Idris 1999) Kamil Idris, Director General of WIPO, Welcome message, http://www.wipo.org/eng/dg_idris.htm, accessed Sept. 1999, since altered

(Impett 1994) Jonathan Impett, 'A meta-trumpet(-er)' in *Proceedings of the International Computer Music Conference*, ICMA: San Francisco, 1994

(Impett 2002) Jonathan Impett, Research seminar at University of East Anglia, 22 Apr. 2002

(Infusion 2003) I-cube system described at http://www.infusionsystems.com/, accessed June 2003

(IRWIN/NSK 1996) Slovenian IRWIN/NSK project *Transnacionala. A Journey from the East to the West*, Atlanta-Seattle USA, June 28–July 28 1996

(Jackson 1960) A. S. Jackson, *Analog Computation*, McGraw-Hill: New York, 1960

(Jameson 1983) F. Jameson, 'Postmodernism and Consumer Culture' in (Foster 1985)

(Jencks 2000) C. Jencks, 'Black box, white cube, ersatz cathedral, shopping mall and renta-culture', *The Art Newspaper*, No.109, Dec. 2000, p.45.

(Jones 1995) S. Jones, *Rock Formation: Music, Technology and Mass Communication*, Sage: Newbury Park, 1995

(Johnson 1997) Peter Johnson, *Pretty Happy!*, White Pine Press: Fredonia, 1997

(Kabakov 1989) I. Kabakov, *10 Characters*, ICA, London, 1989

(Kames 1762) Lord Kames (Henry Home), *Elements of Criticism*, A. Miller: London and A. Kincaid & J. Bell: Edinburgh, 1762, Vol.II, Ch.24, pp.432–433

(Kames 1785) Lord Kames, (Henry Homes), *Elements of Criticism*, Printed for J. Bell & W. Creech: Edinburgh, 1785, sixth edition, Vol.I, p.97

(Kapp 1942) E. Kapp, *Der Ursprung der Logik bei den Griechen*, Vandenhoek & Ruprecht: Göttingen, 1965, originally published in 1942

(Karshan 1975) D. Karshan, *Malevich. The Graphic Work 1912–1930. A Print Raisonne, Catalogue*, Israel Museum: Jerusalem, 1975, p.15

(Kellaway 1998) Lucy Kellaway, 'Wired, weird and wonderful', *Financial Times*, Sat 14 Nov. 1998, p.III

(Kelly & Melia 1999) Ed Kelly & Nick Melia, *Block Groove*, ARiADA, University of East Anglia, 1999

(Kelly 1998) Kevin Kelly, executive editor of *Wired magazine* quoted in (Kellaway 1998)

(Kember 1999) Pamela Kember, 'A Battle With Existence Itself: The work of Gu Wenda', *Chinese Type Contemporary Magazine*, Vol.2, No.3, June 1999, http://www.chinese-art.com/volume2issue3/image100/Other/Other2.htm, accessed June 2003

(Kendall 1999) G. Kendall, Pop Music: Authenticity, Creativity and Technology. *Social Alternatives*, Vol.18, No.2, 1999, pp.25–28

(Key 1965) K. A. Key, *Analogue Computing for Beginners*, Chapman & Hall: London, 1965

(Kharkhordin 1999) O. Kharkhordin, *The Collective and the Individual in Russia. A Study of Practice*, University of California Press: Berkeley/Los Angeles/London, 1999, pp.136–8, 153.

(Kierkegaard 1843) Søren Aabye Kierkegaard, *Repetition*, translated by W. Lowrie, Harper: New York, 1964, originally published in 1843, p.52

(Kirkland 1918) Winifred Margaretta Kirkland, *The Joys of Being a Woman and Other Papers*, Books for Libraries Press: Freeport, 1968, p.12

(Kivy 1980) P. Kivy, *The Corded-Shell: Reflections on Musical Expression*, Princeton University Press: Princeton, 1980

(Kivy 1984) P. Kivy, *Sound and Semblance: Reflections on Musical Representation*, Princeton University Press: Princeton, 1984

(Kontova et al. 1997) H. Kontova, G. Politi & F. Bonami, 'Violence, Man's Vulnerability and Sex', *Flash Art*, Vol.xxx, No.194, May–June, Nov. 1996, published 1997, pp.88–89

(Korn & Korn 1964) Granino A. Korn & Theresa M. Korn, *Electronic Analog and Hybrid Computers*, McGraw-Hill: London, 1964

(Kosolapov 1992) Aleksandr Kosolapov, *Malevich/Marlborough*, Sots Art exhibition, Lenin Museum, Moscow 1992, photograph Vladimir Vasilev, see (Andreeva 1995 pl.13)

(Krauss 1986) R. Krauss, 'The Originality of the Avant Garde' in *The Originality of the Avant Garde and Other Myths*, Harvard University Press: Cambridge Mass., 1986, pp.151–70.

(Kundera 1988) Milan Kundera, 'Dialogue on the Art of Composition' in *The Art of the Novel*, Faber & Faber: London, 1988, pp.73–76

(Labò 1999) Mario Labò cited in (Rudofsky 1969)

(Lang 1990) Berel Lang, *The Anatomy of Philosophical Style*, Blackwell: Oxford, 1990, p.11

(Langley 1728) Batty Langley, *New Principles of Gardening or the laying out and planting Parterres … With … directions for raising fruit-trees, etc.*, A. Bettesworth and J. Battey: London, 1728

(Laplace 1952) Pierre Simon Laplace, *A philosophical essay on probabilities*, translated by F. W. Truscott and F. D. Emory, Dover: New York, 1952, p.4

(Lentricchia & McLaughlin 1990) edited by Frank Lentricchia & Thomas McLaughlin, *Critical Terms for Literary Study*, University of Chicago Press, 1990

(Leatherbarrow 1984) David Leatherbarrow, 'Character, Geometry and Perspective: the Third Earl of Shaftesbury's Principles of Garden Design' in *Journal of Garden History*, Vol.4, No.4, 1984, pp.332–358

(Leslie 1999) Michael Leslie, *History and Historiography in the English Landscape Garden* in (Conan 1999 pp.91–106)

(Lessing 1984) Gotthold Ephraim Lessing *Laocoon, An essay on the limits of painting and poetry*, Johns Hopkins University Press: Baltimore 1984, p.78

(Lévi-Strauss 1963) Claude Lévi-Strauss, *Structural Anthropology*, translated by Claire Jacobson and Brooke Grundfest Schoepf, Basic Books: New York, c1963

(Limbrick 2001) *Personal Space* first performed 19 Feb. 2001 in 'Sonic Arts 19' by Simon Limbrick at the John Innes Centre, University of East Anglia

(Lindley 1990) C. Lindey, *Art in the Cold War. From Vladivostok to Kalamazoo 1945–1962*, The Herbert Press: London, 1990, pp.10, 104

(Lingwood 1989) *Erik Bulatov*, edited by J. Lingwood, ICA: London, 1989

(Litman 1994) Jessica Litman, 'The Exclusive Right To Read', *Cardozo Arts and Entertainment Law Journal*, Vol.13, No.1, 1994, p.29

(Lodder 1983) C. Lodder, *Russian Constructivism*, Yale University Press, 1983, pp.1–5.

(Lowenstein 1998) Douglas Lowenstein, 'U. S. Senate Approves Resolution to Protect Intellectual Property', Interactive Digital Software Association press release, Oct. 16, 1998

(Lurija 1974) A.R. Lurija, *Die historische Bedingtheit individueller Erkenntnisprozesse*, VCH Verlag: Weinheim, 1974

(Lutz & Ascher 1999) Mark Lutz and David Ascher, *Learning Python*, O'Reilly: Sebastopol, 1999

(Lyotard 1997) Jean-Francois Lyotard, *Postmodern Fables* translated by Georges Van Den Abbeele, University of Minnesota Press: London, 1997

(MacClary c1750) John MacClary, Letter, by the gardener, advising how to tour Rousham, c1750, published in (Batey 1983)

(Maclean 1988) Marie Maclean, *Narrative As Performance: The Baudelairean Experiment*, Routledge: London, 1988, p.18

(MacDonnel 1991) D. MacDonnel, *Theories of Discourse: an introduction*. Blackwell: Oxford, 1991

(Malevich 1927) Kasimir Malevich, *Suprematismus. Large White Cross on Grey* (before 1927), o/c, 88 x 68cm Stedelijk Museum: Amsterdam

(Manchester 1999) Philip Manchester, Revenues soar but users are cautious, *Financial Times IT Review*, 3 Mar. 1999, p.VI

(Mandelstam 1933) Osip Mandelstam, 'Conversation About Dante' published in 1933 reproduced in (Harris 1991)

(Mason 1768) George Mason, *Essay on Design in Gardening*, printed for Benjamin White: London, 1768

(McCartney 1996) James McCartney, 'SuperCollider: a new real time synthesis language', presented at the *International Computer Music Conference* (ICMC'96), Hong Kong, 19–24 Aug. 1996. Software available at http://www.audiosynth.com/ June 2003

(McCormmach 1971) *Historical Studies in the Physical Sciences*, edited by R. McCormmach, University of Pennsylvania Press: Philadelphia, 1971

(Mead 1934) G. H. Mead, *Mind, Self, and Society, From the Standpoint of a Social Behaviorist*, University of Chicago Press, 1934

(Melia 2003) Nick Melia, ARiADA research seminar, University of East Anglia, 17 March 2003

(Metasynth 2003) Metasynth, U & I Software, http://www.metasynth.com/, accessed June 2003

(MIDI 2003a) Musical Instrument Digital Interface — http://www.midi.org/about-midi/specshome.shtml, accessed June 2003

(MIDI 2003b) http://www.midi.org/about-midi/gm/gminfo.shtml, accessed June 2003

(Mill 1869) John Stuart Mill, *On Liberty*, 1869, Chapter III: 'Of Individuality, as One of the Elements of Well-Being'

(Minsky 1986) Marvin Minsky, *The Society of Mind*, Simon & Schuster: New York, 1986

(Minsky 1989) Marvin Minsky, 'Music, Mind, and Meaning' in *Music, Mind, and Brain: The Neuropsychology of Music*, edited by Manfred Clynes, Plenum: London, pp.1–19

(Mironenko 1998) V. Mironenko, 'Re: To Bite or to Lick', *Moscow Art Magazine*, no.22, 1998, p.1 of 2

(Mitchell 1990) W. J. T. Mitchell, 'Representation' in (Lentricchia & McLaughlin 1990)

(Molander 1990) Bengt Molander, 'Socratic Dialogue: On Dialogue and Discussion in the Formation of Knowledge', *Artificial Intelligence, Culture and Language: On Education and Work*, Springer-Verlag: London, 1990, Chapter 25, p.230

(Monk 1991) Cited by Ray Monk in Ludwig Wittgenstein: The Duty of Genius, Vintage Books: London, 1991

(Monk 2001) John Monk, 'Digital Myths', *Proceedings of the Sixth Conference of the International Society for the Study of European Ideas (ISSEI)*, 'Twentieth Century European Narratives: Tradition & Innovation', University of Haifa, Israel, Aug. 16–21, 1998, published on CD 2001

(Monroe 1998) Jonathan Monroe, Cited in (Delville 1998 p.xxx)

(Nancy 2000) Nancy**,** Jean-Luc, *Being Singular Plural*, Stanford University Press, 2000

(Nedo 1999) Michael Nedo cited in (Peters 1999)

(von Neumann & Morgenstern 1944) John von Neumann & Oskar Morgenstern, *Theory of Games*, Princeton University Press: Princeton, 1944

(von Neumann 1958) John von Neumann, *The Computer and the Brain*, Yale University Press: New Haven, 1958

(von Neumann 1957) Klara von Neumann, Sept. 1957, Preface to (von Neumann 1958) pp.v–x

(Nichols 1999) Kenneth Nichols, 'The Age of Software Patents', *IEEE Computer*, Apr. 1999, pp.25–31

(Noon 1993) Jeff Noon, *Vurt*, Ringpull: Stockport, 1993

(Noon 1995a) Jeff Noon at a presentation reading at UEA Drama Studio Theatre, Norwich, 27 Oct. 1995

(Noon 1995b) Jeff Noon, *Pollen*, Ringpull: Stockport, 1995

(Nussbaum 1992) Martha Nussbaum, *Love's Knowledge: Essays on Philosophy and Literature*, Oxford University Press: New York, 1992

(Orton 1859) J. R. Orton, 'Trial Trip of the "Flying Cloud" ', Atlantic Monthly, No.4, Nov. 1859, pp.575–590

(Oswald 1987) John Oswald**,** 'Plunderphonics, or audio piracy as a compositional prerogative' in *RéR Quarterly*, Vol.2, No.1, pp.24–29

(Palmer 1915) John Palmer, 'George Bernard Shaw: Harlequin or Patriot?', *The Century*, Vol.89, The Century Co: New York, Nov. 1914–Apr. 1915, p.772

(Paszkiewicz & Ames-Lewis 2002) P. Paszkiewicz, P & F. Ames-Lewis, *Art, Ritual, Religion*, Instytut Sztuki PAN: Warsaw, 2001/2

(Paynter et al. 1992) *Companion to Contemporary Musical Thought*, edited by J, Paynter, T. Howell, R. Orton, & P. Seymour, 2 volumes, Routledge: London, 1992

(Peirce 1955) Charles Sanders Peirce, 'Logic as Semiotics; The Theory of Signs' in *Philosophical Writings of Peirce*, edited by Justus Buchler, Dover: New York, 1955, p.99

(Perloff 1996) Marjorie Perloff, 'The "Synopsis of Trivialities": The Art of the Philosophical Investigations', Chapter Two of *Wittgenstein's Ladder: Poetic Language and the Strangeness of the Ordinary*, University of Chicago Press, 1996, p.69

(Peters & Burbules 1999) Michael Peters and Nicholas Burbules, 'Wittgenstein/Styles/Pedagogy' in (Peters & Marshall 1999). Electronic version at http://faculty.ed.uiuc.edu/burbules/ncb/papers/wittgenstein.html, accessed July 2003

(Peters 1999) Michael Peters, *Philosophy As Pedagogy: Wittgenstein's Styles Of Thinking* in (Peters & Marshall 1999). Online text published in Radical Pedagogy, 2001, http://radicalpedagogy.icaap.org/content/issue3_3/4-peters.html, accessed July 2003

(Peters & Marshall 1999) Michael Peters and James Marshall (eds), *Wittgenstein: Philosophy, Postmodernism, Pedagogy*, Bergin & Garvey: Westport, 1999

(Pisan 1621) Views attributed to Christine de Pisan, quoted in (Bear 2003)

(Plant 1997) Sadie Plant, Zeros + ones, Fourth estate: London, 1997

(Plato 1892) Plato, 'Phaedrus', 265e, translated by Benjamin Jowett, Macmillan: London, 1892

(Plato 1970) Plato, 'Alcibiades I', §129e in *The dialogues of Plato*, Vol.1 translated by Benjamin Jowett, edited by R. M. Hare and D. A. Russell, London: Sphere, 1970

(Poe 1912) Edgar Alan Poe, 'The assignation' in Edgar Allan Poe, *Tales of Mystery and Imagination*, J. M. Dent & Sons: London, 1912, pp.149–150

(Politi 1997) 2G. Politi, 'Freedom to breathe', *Flash Art*, Vol.xxx, No.194, May–June, 1997, p.88

(Polyani 1966) M. Polanyi (1966), *The Tacit Dimension*, Routledge & Kegan Paul: London 1967

(Pope 1732) Alexander Pope, Epistle to Lord Burlington in *A Miscellany on Taste*, G. Lawton, T. Osborn, J. Hughes: London, 1732

(Popper 1945) K. R. Popper, *The Open Society and its Enemies*, (1944/45), German Translation, Mohr: Tübingen, 1992

(Poster 1988) *Jean Baudrillard. Selected Writings*, edited by Mark Poster, Stanford University Press: Stanford, 1988

(Prontaprint 1999) Sign in a Prontaprint shop, 150, New Cavendish Street, London, 14 Jan. 1999

(Proudhon 1972) Pierre-Joseph Proudhon, *System of Economical Contradictions or, The Philosophy of Misery*, translated by Benjamin R. Tucker Photographic reprint of the 1888 edition, Arno Press: New York, 1972, p.309

(Proust 1992) Cited in (Nussbaum 1992 p.2)

(Puchta 1996) Susann Puchta, 'On the Role of Mathematics and Mathematical Knowledge in the Invention of Vannevar Bush's Early Analog Computers', *IEEE Annals of the History of Computing*, Vol.18, No.4, 1996, pp.49–59.

(Python 2003) http://www.python.org/, accessed June 2003

(Quine 1969) W. V. O. Quine, *Natural Kinds, Ontological Relativity and Other Essays*, Columbia University Press: New York, 1969, pp.114–138

(Raban 1974) Jonathan Raban, *Soft City*, Hamish Hamilton: London, 1974, p.38

(Raev 1970) Sergei Raev's poster *Criminal Responsibility/ Prepustnikov — kotvetu!*, 1970, USSR, Sergei Avvakumov: Moscow in (Aulich & Sylvestrova 1999)

(Rawsthorn 1999) Alice Rawsthorn, 'Big five shudder at digital jukeboxes', *Financial Times*, 13 Jan. 1999, p.18

(Reynolds 2003) http://www.red3d.com/cwr/boids/, accessed June 2003

(Richard 1994) D. M. Richard, 'Computer Music and the Post-Modern: a Case of Schizophrenia', *Computer Music Journal*, Vol.18 No.4, 1994, pp.26–34

(Robertson 1964) *Characteristics of Men, Manners, Opinions and Times*, edited by J. M. Robertson, Bobbs-Merrill: Indianapolis, 1964, p.125

(Rosenthal 1997) N. Rosenthal, *Sensation. Young British Artist from the Saatchi Collection*, Royal Academy of Arts: London, 1997

(Ross 1990) D. A. Ross, *Between Spring and Summer. Soviet Conceptual art in the Era of Late Communism*, MIT Press: Cambridge Mass., 1990

(Roussell 1999) Patrice Roussel, http://www.wnur.org/jazz/artists/marclay.christian/discog.html, Dec. 1999, accessed July 2003

(Rovan et al. 1997) Joseph Rovan, Marcelo Wanderley, Shlomo Dubnov& Phillipe Depalle, 'Instrumental Gestural Mapping Strategies as Expressivity Determinants in Computer Music Performance' in *Proceedings of the Kansei — The Technology of Emotion Workshop*, Genova, Italy, Oct. 1997, http://www.ircam.fr/equipes/analyse-synthese/wanderle/Gestes/Externe/Mapp/kansei_final.htm, accessed July 2003

(Rudofsky 1969) Bernard Rudofsky, *Streets for People*, Doubleday & Co.: New York, 1969, p.66

(Säätelä 1998) Simo Säätelä, *Aesthetics as Grammar: Wittgenstein and Post-Analytic Philosophy of Art*, Uppsala University, Department of Aesthetics, 1998

(Said 1991) Edward Said, *Musical Elaborations*, Chatto and Windus: London, 1991

(Said 1993) Edward Said, *Culture and Imperialism*, Chatto & Windus: London, 1993, pp.xi–xii, xxiv–xxviii, 47–8, 64, 235

(Sassover 1995) R. Sassower, *Cultural Collisions — Postmodern Technoscience*, Routledge: London, 1995

(Schaeffer 1966) Pierre Schaeffer, *Traité des objets musicaux*, Editions du Seuil: Paris, 1966

(Schafer 1986) R. M. Schafer, *The Thinking Ear*, Arcana Editions: Toronto, 1986

(Sennett 1994) R. Sennett, *Flesh and Stone*, Norton & Co: New York, 1994

(Shaftesbury 1705) Anthony the Third Earl of Shaftesbury, *The Moralists*, 1705 reprinted in (Robertson 1964)

(Shaw 1915) Bernard Shaw, preface to the 'Plays for Puritans' quoted in (Palmer 1915)

(Shell 1999) Anonymous, '100 years of the Pecten', Shell visual identity guideline, No.2, 15 Feb. 1999, http://www.shell.com/static/royal-en/downloads/pectenhistory.pdf, accessed June 2003

(Shenstone 1764) William Shenstone, 'Unconnected Thoughts on Gardening', 1764 translated by Joseph Spence edited by Jean Denis Attiret, in *A particular account of the Emperor of China's gardens near Pekin*, Garland: New York, 1982

(Showroom 1989) The Showroom in association with Camden Arts and Entertainments and the USSR Union of Artists, *Transformations. The Legacy of Authority: recent art from the Soviet Union* presented Camden Arts Centre: London, 1989

(Simic 1997) Charles Simic, 'A Long Course in Miracles' in (Johnson 1997 pp.15–17)

(Simpson 2002) P. Simpson, 'Conflicting Theologies: Authenticity and the Case of Alexander Brener', submitted for publication in (Paszkiewicz & Ames-Lewis 2002)

(Simpson 2003) P. Simpson (2003), 'Alexander Brener: Creative Vandalism as a Mode of Hybrid Thought', this volume, pp.41–58

(Small 2001) James S. Small, *The Analogue Alternative*, Routledge: London, 2001

(Sokolov 1997) A. Sokolov, 'Alexander Brener. Chronicle of a trial', *Flash Art*, Vol.xxx, No.194, May–June 1997

(Somers Cocks 1990) A. Somers Cocks, 'Editorial', *Apollo*, Vol.cxxxiv, No.131, Jan., 1990, p.3

(SoundscapeUK 2003) The UK Soundscape Community, http://www.jiscmail.ac.uk/lists/SOUNDSCAPEUK.html, accessed June 2003

(Stefik 1997) Mark Stefik, 'Trusted Systems', *Scientific American*, March 1997

(Stelarc 2003) http://www.stelarc.va.com.au/, accessed June 2003

(Stewart 1993) Susan Stewart', *On longing: Narratives of the Miniature, the Gigantic, the Souvenir, the Collection*, Duke University Press: Durham 1993

(Stravinsky 1959) Igor Stravinsky and Robert Craft, *Conversations with Igor Stravinsky*, Faber: London; 1959.

(Swift 1726) Jonathan Swift, *Gulliver's Travels*, Penguin, 1994, p.203, first published 1726

(Switzer 1715) Stephen Switzer, *The Nobleman, Gentleman, and Gardener's Recreation*, B. Barker, & C. King: London, 1715

(Switzer 1718) Stephen Switzer, *Ichnographia Rustica*, D. Browne, B. Barker and C. King, W Mears, and R. Gosling: London, 1718, augmented in 1742, J. and J. Fox: London

(Taylor 1995) B. Taylor, *The Art of Today*, Everyman/Weidenfeld & Nicholson: London, 1995

(Thaemlitz 2002) Terre Thaemlitz, 'GLOBULE of NON-STANDARD: An Attempted Clarification of Globular Identity Politics in Japanese Electronic 'Sightseeing Music', 2002, unpublished paper

(Théberge 1997) Paul Théberge, *Any Sound You Can Imagine: Making Music/Consuming Technology*, Wesleyan University Press: Hanover, N.H., 1997

(Tolstoy 1978) L. N. Tolstoy, *War And Peace*, translated by Rosemary Edmonds, Penguin: Harmondsworth, 1978, first published in Russian in 1869

(Truax 1988) Barry Truax, 'Real-time granular synthesis with a digital signal processor', *Computer Music Journal*, Vol.12, No.2, 1988, pp.14–26, see also http://www.sfu.ca/~truax/gran.html

(Tsividis 2003) Yannis Tsividis, cited in (Eisenberg 2003)

(Tupitsyn 1990) V. Tupitsyn, 'East West exchange. Ecstasy of (Mis)Communication' in (Ross 1990)

(Tucker 1999) Emma Tucker, 'Battle lines confused in EU copyright wars', *Financial Times,* 20 Jan. 1999, p.3

(Turing 1937) A. M. Turing, 'On Computable Numbers, with an Application to the Entscheidungsproblem', *Proceedings of the London Mathematical Society,* Series 2, No.42, 1937, pp.230–265

(Turner 1969) V. Turner, *The Ritual Process: Structure and Antistructure*, Aldine de Gruyter: New York, 1969

(Valéry 1962) Paul Valéry, Rhumbs, Vol.2 in *Oeuvres* Bibliotheque de la Pléiade: Paris, 1962, p.649

(Wada 2003) Shigeto Wada, research at University of East Anglia currently unpublished, 2003

(Walker 1999) J. Walker, *Art & Outrage. Provocation, Controversy and the Visual Arts,* Pluto Press: London, 1999, pp.181, 185–6.

(Wallace 1999) Tom Wallace, *City Systems* (1997–99), Paradigm Discs: London

(Walpole 1771) Horace Walpole, 'The history of the modern taste in gardening', in *Anecdotes of Painting in England, with some account of the principal artists; … collected by … G. Vertue and now digested and published from his original MSS. by … H. Walpole. (To which is added, The history of the Modern Taste in gardening [by the latter].)*, Strawberry-Hill, 1762-71

(Walpole 1987) Horace Walpole, *On modern gardening: an essay*, edited by Rebecca More, Stourton Press: Hackney, 1987

(Ware 1756) Isaac Ware, *A complete body of architecture: adorned with plans and elevations, from original designs*, T. Osborne & J. Shipton: London, 1756

(Waters 1997) Simon Waters, *Beyond the acousmatic: hybrid tendencies in electroacoustic music,* Swedish Section of ICEM: Tyresö, 1997

(Waters 2000a) Simon Waters, 'Beyond the acousmatic: hybrid tendencies in electroacoustic music' in (Emmerson 2000 pp.56–83)

(Waters 2000b) Simon Waters, 'The musical process in the age of digital intervention' in *ARiADA Texts* No.1, Dec. 2000, http://www.ariada.uea.ac.uk/

(Weber 1995) *Points … Interviews*, 1974–1994, edited by E. Weber, translated by P. Kamuf & others, Stanford University Press, 1995

(WFAE 2003) World Forum for Acoustic Ecology archive — http://interact.uoregon.edu/MediaLit/wfae/journal/index.html, June 2003

(Whately 1770) Thomas Whately *Observations on Modern Gardening,* 1770, reprinted in (Charlesworth 1993 Vol.II)

(Whately 1771) Thomas Whately, *L'art de former les jardins modernes ou L'Art des jardins anglois,* translated into French by François-de-Paul La Tapie, Charles Antoine Jombert Père, Paris 1771, Introduction, pp.lii–liii

(Wiener 1950) Norbert Wiener, *The Human Use of Human Beings*, Free Association Books: London, 1989, originally published 1950

(Wilden 1980) Anthony Wilden, *System and Structure*, Tavistock: London, 1980, p.86

(Williams 1983) Robert Williams, 'An Essay on the Different Natural Situations of Gardens' in *Journal of Garden History*, Vol.3, No 2, pp 144-156, 1983

(Wilson 1972) Arthur M. Wilson, Diderot, Oxford University Press: New York, 1972

(Winch 1958) Peter Winch, *The idea of a social science and its relation to philosophy*, Routledge & Kegan Paul: London, 1958

(Wishart 1985) T. Wishart, *On Sonic Art*, Imagineering Press: Yorks, 1985

(Wittgenstein 1961) Ludwig Wittgenstein, *Tractatus Logico-Philosophicus*, Routledge & Kegan Paul: London, 1961

(Wittgenstein 1969) Ludwig Wittgenstein, *On Certainty*, edited by G. E. M. Anscombe and G. H. von Wright, translated by Denis Paul and G. E. M. Anscombe, Blackwell: Oxford, 1969.

(Wittgenstein 1974) Ludwig Wittgenstein, *Philosophical Grammar*, edited by Rush Rhees, translated by Anthony Kenny, Blackwell: Oxford, 1974, p.213

(Wittgenstein 1980) Ludwig Wittgenstein, *Culture and Value*, edited by G. H. Von Wright in collaboration with Heikki Nyman, translated by Peter Winch, Basil Blackwell: Oxford, 1980

(Wittgenstein 1989) Ludwig Wittgenstein, *Wittgenstein's Lectures on the Foundations of Mathematics*, edited by Cora Diamond, University of Chicago Press: Chicago, 1989, p.44

(Wittgenstein 1991) Ludwig Wittgenstein, *The Blue and Brown Books*. Cited in (Monk 1991 p.338)

(Wittgenstein 1992) Ludwig Wittgenstein, *Philosophical Investigations*, translated by G.E.M. Anscombe, Blackwell: Oxford, 1992

(Wittgenstein 1998) Ludwig Wittgenstein, *Culture and Value*, edited by Georg Henrik von Wright & Heikki Nyman, translated by Peter Winch, Blackwell: Oxford, 1998

(Wollen 1985) P. Wollen, *Komar & Melamid*, The Fruitmarket Gallery: Edinburgh, 1985

(WSP 2003) World Soundscape Project at http://www.sfu.ca/~truax/wsp.html, accessed June 2003

(WTO 1994) World Trade Organisation, 'Agreement on trade-related aspects of intellectual property rights, 1994' in *The Results of the Uruguay Round of Multilateral Trade Negotiations: The Legal Texts*, Cambridge University Press: Cambridge, Nov. 1999

(Yakimovitch 1998) A. Yakimovitch, 'School of Soft Self-Flagellation. On some mysteries of the East in relation to the West', *Moscow Art Magazine,* No.22, 1998, pp.1–4

(Zabel 1998) I. Zabel, 'We and the Others', *Moscow Art Magazine,* No.22, 1998, p.3 of 7

(Zeilinger 2003) Anton Zeilinger, *Einsteins Schleier: Die neue Welt der Quantenphysik*, C.H.Beck: München, 2003